

## LA-UR-21-21544

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Title: Operational and Mission Highlights A Monthly Summary of Top Achievements January 2021

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Intended for: Monthly Newsletter

Issued: 2021-02-17

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# Operational and Mission Highlights

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A MONTHLY SUMMARY OF TOP ACHIEVEMENTS

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**January 2021**

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## ASC Scientists Develop a New Explosive Model to Accelerate Detonator Design

Chris Ticknor of the Physics and Chemistry of Materials (T-1) group is the project lead of the Laboratory's Physics and Engineering Models High Explosives effort. Ticknor, along with Tariq Aslam, also of T-1, are developing a high-fidelity modeling capability for detonators.

The duo are stimulating Pentaerythritol tetranitrate (PETN), a common explosive in detonators. PETN is a fast-reacting high explosive that has an extremely short reaction-zone length scale within which chemical kinetics determine the explosive's behavior. Resolving this short length scale makes it challenging to understand and improve the burn model.

Personnel from Advanced Simulation and Computing (ASC) have helped the Office of Experimental Sciences design two novel experiments: the "rod impactor" and the "micro-sandwich." These experiments, which directly interrogate PETN initiation threshold behavior and burn characteristics, have provided useful data to improve the PETN model. The experiments have also been used to predict polymethylmethacrylate (PMMA) "rod-impact" conditions used to determine go/no-go impact velocities.

## Hazardous Transportations Operations Team Supports Mission Critical Shipment to LANL

In November 2020, the Hazardous Transportations Operations Team supported a mission-critical transfer conducted in collaboration with C-Nuclear and Radiochemistry (NR) and NPI-7. The transfer took place from Sandia National Laboratories to Los Alamos National Laboratory. The collaborators transferred a UK-T173 drum in support of the joint project through the UK's Atomic Weapons Establishment.

The material transfer is critical because there are no available commercial standards, especially for the analytes of interest. The purpose is to help both countries address the needs of certification of weapon systems in the US for DOE NNSA and in the UK for the Ministry of Defense. The program is part of Joint Operations Weapons Group-22/6 (JOWOG) uranium metal exchange program. Shipping support is absolutely the

most critical part of the program. The program simply does not happen without the same materials being available to the various participating labs in pristine conditions and in a timely manner.

## Laboratory's Cross-Platform Study of Early-Time Plutonium Aging Takes Essential Steps Forward

All measurement platforms for this study are now fully operational. Moreover, personnel are applying these platforms to plutonium samples; this work was paused in March 2020 because of the COVID-19 pandemic. The platforms include (1) resonant ultrasound, (2) x-ray diffraction, (3) constant temperature dilatometry, and (4) differential scanning calorimetry. Additionally, the microstructural characterization report for the aliquot material used in the study has been completed.

## Laboratory Manufactures Cylinder Test Sample

Laboratory scientists have manufactured a cylinder test sample using a novel wire-fed additive-manufacturing technique. This work was performed in support of upcoming SCDS pegpost on manufacturing for the future stockpile.

Scientists will characterize the as-built sample through neutron diffraction using the Spectrometer for Materials Research at Temperature and Stress (SMARTS) diffractometer at the Los Alamos Neutron Science Center (LANSCE) Lujan Center and with standard metallurgical and mechanical property testing.

## Plutonium Samples Slated for Disposition Find a New Home for Advancing Scientific Understanding of Plutonium Aging

Several plutonium samples have found a new application, now that they have completed their intended lifecycle under the Plutonium Sustainment Program (NA-191). Previously used to characterize the microstructure of shape cast parts, these samples were transferred to the Office of Experimental Science (NA-113) for repurposing toward dynamic experiments.

By taking full advantage of this existing material, Laboratory personnel, in collaboration with Sandia National Laboratories (SNL), can now conduct several key pluto-

ni-um experiments not previously possible in FY21. To conduct these experiments, the collaborators are using the Z-machine, a pulsed-power machine located at SNL that is used to study the dynamic material properties of plutonium along weapons-relevant trajectories. These experiments are a critical part of the science underpinning the Plutonium Aging National Strategy and provide direct support for FY21 and FY22 L2 and L1 milestones, respectively. The material was transferred in December 2020 and the Z-machine experiments are planned for March 2021.

## Process Update Leads to Significant Savings in Pit Production

Multiple teams supporting Weapons Production collaborated to remove a requirement that led to exceptional time and money savings. The MT38 Far Field Gamma measurement and analysis requirement was determined safe and acceptable for removal in the Plutonium Facility's pyrochemical and electrowinning processes. Removing this step will save one hour per sample for data collection and analysis, which will amount to 240 hours' worth of savings per year. This analysis and taking action to improve processes continues to support the ramp up to the production of at least 30 pits per year.

### SCIENCE, TECHNOLOGY, AND ENGINEERING

## DOE Energy Secretary Recognizes the Laboratory's COVID-19 Testing Lab Team

The DOE Energy Secretary recently recognized several Laboratory employees for their contributions in addressing the COVID-19 pandemic. Individuals from Bioscience Division and Occupational Safety and Health Division were honored for their contributions to the COVID-19 Clinical Testing Lab. The Secretary noted their contributions provided "testing to keep the workforce safe and allow for safe resumption of work, while in turn helping reduce the spread of the novel coronavirus (COVID-19)."

Another award recognized individuals from multiple Laboratory divisions for their work as part of the National Virtual Biotechnology Laboratory Team and the High Performance Computing Resource Team. The Secretary described how all the teams "helped ensure

the health and wellbeing of our workforce, allowed for the uninterrupted fulfillment of our mission, and contributed to the Nation's response to the pandemic" and that the individuals honored "have surpassed the highest standards of excellence, demonstrated great knowledge and ability, and exhibited an exceptional commitment to service."

## ECP Software Technology Capability Assessment Report Made Available to the Public

The latest update (V2.5) of DOE's Exascale Computing Project (ECP) Software Technology (ST) Capability Assessment Report is now available [online](#). The update provides an overview and assessment of current ECP ST capabilities and activities, thus providing stakeholders and the broader high-performance computing community information that can be used to assess ECP ST progress and plan their own efforts accordingly.

## IDEAS Project Proposal Accepted for the DOE Office of Environmental Management's Minority Serving Institution Partnership Program

A project created by Hai Ah Nam of Computational Physics and Methods (CCS-2) was recently accepted as part of the DOE Office of Environmental Management's Minority Serving Institution Partnership Program (DOE-EM-MSIPP). The project's title is IDEAS-Watersheds: Accelerating Watershed Science through Community-driven Software Ecosystem. DOE-EM-MSIPP helps minority students obtain internship opportunities in STEM (science, technology, engineering, and math) fields.

IDEAS-Watersheds integrates standalone siloed codes into an interoperable software ecosystem. It does this by using common computational libraries and frameworks to share capabilities and advance computational watershed science.

Details about the internship opportunity: <https://www.zintellect.com/Opportunity/Details/DOE-MSIPP-21-7-LANL>.

## Laboratory Completes Metals Experiments at pRad in Support of First Planned Experimental Series for Future LANSCE Pu@pRad Capability

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The metal experiments at pRad are designed to compare dynamic material failure at high pressures to the predicted behavior modeled in numerical simulations. These experiments measure the shock passing through the material and the subsequent failure using 21 frames of proton radiography (prad). The speed of the moving metal surface is captured with five channels of Photonic Doppler Velocimetry per shot.

## Laboratory Resonant Ultrasound Measurements Indicate Aging Rate of Plutonium is Sensitive to Chemistry

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In a series of high-precision resonant ultrasound (RUS) measurements collected on plutonium samples with varying chemistries and microstructures, scientists found that all samples exhibited a reduction in the moduli stiffening rate with age. That is, plutonium exhibits a large moduli stiffening at early times — this stiffening continues to increase but at a reduced rate as the sample ages. However, the rate of the stiffening reduction was found to be quite different between samples of different pedigrees over the same period. Work is ongoing to determine the principal materials driver for these measured differences in stiffening rates with time.

## Laboratory Scientists in Special Nuclear Forensics Issue of Analytical Chemistry

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Laboratory scientists Jaqueline Kiplinger (C-IIAC), Julianna Fessenden (XTD-NTA), and Mark Straub (C-IIAC), along with John Arnold (UC Berkeley), have published a review article on recent advances in nuclear forensic chemistry. Featured on the journal's cover, the article serves as an introduction to a special issue of *Analytical Chemistry* on the topic of nuclear forensic chemistry.

As nuclear forensics has continued to develop as a unique field of research, new advances in chemistry have revolutionized the ability to analyze rapidly and quantitatively radioactive materials for attribution.

In particular, microanalytical techniques originally developed for nanoscience, such as micro-X-ray fluorescence, SIMS, and SEM-EDX have enabled scientists to perform spatially resolved chemical analyses with only nanograms of material. Such techniques have redefined the paradigm for pre- and post-detonation nuclear forensics, as large quantities of material are no longer necessary for full characterization and attribution.

The scientists' article details how modern nuclear forensic techniques have developed from their origins in chemistry and provides real-world examples of how these techniques have been used to characterize radioactive materials, including fallout from nuclear detonations such as the 1945 Trinity test.

Ref: Anal. Chem. 2021, 93, 1, 3–22, Sept. 14, 2020 (<https://doi.org/10.1021/acs.analchem.0c03571>).

## Laboratory Supercomputing Capabilities are Helping to Understand How Best to Distribute the COVID-19 Vaccine

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The Laboratory's COVID-19 modeling team has been using mathematical models and computational simulations enabled by the Laboratory's supercomputing capabilities to understand how best to distribute the COVID-19 vaccine. What this team has learned is that, although the vaccine is a critical weapon in fighting this virus, the vaccine alone is not going to be enough to keep everyone safe.

In a story that appeared January 5, 2021, in [The Santa Fe New Mexican](#), modeling team leader Sara Del Valle of Information Systems and Modeling (A-1) and Ben McMahon of Theoretical Biology and Biophysics (T-6) shared the team's modeling efforts with the newspaper.

## Laboratory Technologies Showcased in the FLC Planner

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The Laboratory's SEDONA (SpEctroscopic Detection of Nerve Agents), an R&D 100 Award-winning technology, was featured on the April page of the [Federal Laboratory Consortium \(FLC\) Planner](#) for 2021 (the principal investigator for SEDONA is Bob Williams of Bioenergy and Biome Sciences). The FLC is a formally chartered, nationwide network of more than 300 federal laboratories, agencies, and research centers that foster



commercialization best-practice strategies and opportunities for accelerating federal technologies from out of the national laboratories and into the marketplace. Another Laboratory R&D 100 Award-winning technology, “OrganiCam: the first camera for noncontact biodetection in space,” was featured in the Lab Extras section of the FLC Planner. The Chemical, Earth, and Life Sciences Directorate was a partner on this entry.

## Labrador Sea Freshening Linked to Beaufort Gyre Freshwater Release

In a paper to be published in *Nature Communications*, Wilbert Weijer of Computational Physics and Methods (CCS-2), along with Jiaxu Zhang, a former postdoc at the Center for Nonlinear Studies (CNLS), discuss their work associated with a previous episode of strong freshwater release during 1983–1995. They used a numerical model that simulates ocean circulation over the past decades and added virtual dye tracers (“food coloring”) to follow the spread of this freshwater release.

The experiment showed that most of the freshwater reaches the North Atlantic (the Labrador Sea) through a narrow set of passages between Canada and Greenland, known as the Canadian Archipelago. This pathway is less well known than the Fram Strait, which is on the eastern side of Greenland.

The virtual dye tracers also helped the scientists quantify the impacts of the freshwater release on the ocean salinities in the subpolar North Atlantic. They found that the past freshwater release significantly reduced the salinities in the Labrador Sea. From this, they concluded the following: if the current body of freshwater is released, the impacts could even be stronger. This conclusion is relevant as the subpolar North Atlantic is critical for the Atlantic Meridional Overturning Circulation (AMOC), an important circulation pattern in the Atlantic Ocean that regulates northern hemisphere climate. However, assessing the impact of the Beaufort Gyre freshwater release on the AMOC itself was left for future study because the current model could not answer this question.

The study was funded primarily by CNLS and by the HiLAT project (DOE BER).

## LANL Performs Novel Experiments Using Proton Radiography Density Images, Light Emission, and Temperature Measurements

An article based on this work by L. Smilowitz (Physical Chemistry and Applied Spectroscopy) et al. has been published in the *Journal of Applied Physics*, Volume 128, Issue 1. This manuscript describes a combination of measurements that provide insight into the nature of detonation initiation. The work will help scientists to understand functional mechanisms at work in exploding bridgewire detonators.

## Nuclear Forensics Graduate Student Highlighted

Mark Straub, a graduate student in the Isotope and Inorganic Chemistry (C-IIAC) group, was profiled on the Laboratory’s external webpage for his work in nuclear forensics (read the [LANL News Brief](#)). Straub came to the Laboratory in 2017 from UC Berkeley, where he was a radiochemistry graduate student. His work at the Laboratory was part of the [Robert Keepin Nonproliferation Science Summer Program](#). Straub worked with scientists Jaqueline Kiplinger (C-IIAC) and Julianna Fessenden (Nuclear Threat Assessment, XTD-NTA) to study the impact and evolution of nuclear forensics by interviewing experts and touring Laboratory facilities. The Robert Keepin Nonproliferation Science Summer Program is a component of the prestigious Nuclear Science and Security Consortium fellowship.

## New Robot Improves Operations at the COVID-19 Testing Lab

The Laboratory’s Bioscience Division recently installed a new robot that improves operations at the COVID-19 Testing Lab. Thanks to a Laboratory investment, the Kingfisher Flex System robot automates RNA extraction that occurs before RT-PCR (reverse transcription polymerase chain reaction), the process used to confirm the presence or absence of the SARS-CoV-2 virus.

Automating RNA extraction will make a big difference by enabling Testing Lab personnel to process more samples per day while still ensuring consistent, high-quality RNA extraction and purification. The robot will also alleviate the tedium of this procedure and reduce the risk of repetitive motion injuries.

RNA extraction is necessary for separating RNA molecules from everything else that might be present in a patient sample (such as nasal secretions, cell debris, human DNA, or other bacterial or viral components). Once purified, the RT-PCR protocol confirms if the RNA came from the SARS-CoV-2 virus.

## Sanna Sevanto Ranked in Top One Percent Cited of Scientists in Web of Science for 2020

[Clarivate/Web of Science](#) ranked scientist Sanna Sevanto of the Laboratory's Earth Systems Observations (EES-14) group in the top one percent of citations in her field this year. The organization recognized Sevanto as a pioneer in her field (plant and animal science), demonstrated by publishing multiple, highly cited papers this past decade. Sevanto was one of only four scientists recognized this year from the Laboratory. Web of Science has a list of all awardees at <https://recognition.webofscience.com/awards/highly-cited/2020>.

## Travis Tenner of C-NR Receives an NNSA Joule Award

Travis Tenner of the Laboratory's Nuclear and Radiochemistry (C-NR) group and Todd Williamson (formerly at LANL) received the NNSA Joule Award for their work on uranium-particle reference materials. The two scientists produced and delivered a set of uranium-particle reference materials for the International Atomic Energy Agency. This set included specified size, chemical contents, and isotopic compositions, all of which support the Network of Analytical Laboratories (NWAL) Environmental Sample Laboratory quality-control program.

The NNSA Office of International Nuclear Safeguards gives Joule Awards annually for successful transfers of safeguards technologies to international partners. Tenner and Williamson were part of a multilab team (including Savannah River National Laboratory and Pacific Northwest National Laboratory) that supported this project. The award was given January 2021.

### MISSION OPERATIONS

## First Comingled TRU Waste Shipment, Thanks to Triad and N3B Collaboration

Triad National Security, LLC, and Newport News Nuclear BWXT Los Alamos (N3B), continue to expand their collaboration to make the Laboratory and northern New Mexico even safer than it is today by transporting transuranic (TRU) waste to its forever home at the Waste Isolation Pilot Plant (WIPP) in Carlsbad, NM.

On Thursday, January 14, 2021, the first co-mingled shipment to WIPP hit the road. This special shipment comingles new generation (Triad) and legacy (N3B) waste into a common TRUPACT II container bound for WIPP. The comingling of waste from the two contractors will maximize the use of TRUPACT II and improve the overall efficiency of the TRU waste shipping process, ultimately resulting in more drums leaving the Laboratory in fewer trucks.

Overall, in FY21 TRU waste storage capacity use at TA-55 storage has dropped to 36 percent, significantly below the milestone of 50 percent. To date in FY21, 16 shipments with 253 Triad TRU waste containers and 210 N3B TRU waste containers have been sent to WIPP.

## Key Gloveboxes Prepared for Special Nuclear Shipping Project

Teams in Actinide Materials Power & Processing (AMPP) made significant progress on a Special Nuclear Shipping project. The project is part of the Plutonium Sustainment Development, Test, and Evaluation Milestone. This milestone involves retrieving material from the Plutonium Facility vault, repackaging it into containers, and shipping it offsite.

In November 2020, the AMPP-4 Uranium Disposition team successfully turned the air box into an inert — chemically inactive — box and added an airlock by removing old equipment, cleaning and stripping the glovebox, and more — all necessary steps to work toward the June 2021 completion milestone. All this hands-on work was done amidst strict COVID-19-related precautions and guidance.

## Key Safety Upgrades Made to the Laboratory's Plutonium Facility

Personnel use Pressure Differential Transmitters (PDTs) within the Plutonium Facility (PF-4) to help monitoring pressure zones and control fan operation and ventilation. Within the PF-4 Ventilation System, a pressure differential is established and maintained to confinement zones within PF-4. Such zones help control radiological releases by maintaining a reliable cascading pressure differential between enclosures, laboratories, basement and outside air.

As of early January 2021, all 22 PDTs in PF-4 were replaced. Before they were replaced, most PDTs were original to the facility and were starting to experience functionality issues. The 22 replaced PDTs were supported through a NA-50 recapitalization project and represent a crucial step in modernizing and improving PF-4's systems.

The replacement project took little more than a year, beginning in November 2019 and undergoing completion in January 2021. Installing the PDTs required support from operations, engineering, maintenance, procurement, safety basis, radiological control, waste, project management, and others to coordinate the installation.

## Laboratory Employees are Focused on Safety Communications, Articles on SCoR Principles

The Public Affairs group (CEA-PA) in the Communications and External Affairs Division has ramped up its safety communications in FY21 as part of a new initiative to better communicate safety events and lessons learned to the Laboratory's dispersed workforce.

Stories on the internal home page that stress the Safe Conduct of Research (SCoR) principles were some of the most-viewed content in October and November, 2020. An article published on October 16, 2020, [LANSCE fire: Getting it right when things go wrong](#) — detailing how SCoR principles guided employee response to the fire at the TA-53 Lujan Facility — received 2,003 online page views. Stories that also garnered significant readership in the past two months emphasized the importance of security and continuous learning at the Laboratory's National Security Research Center (1,923 page views), focused on employee self-care (1,738 page views), and highlighted a facility engineer honored for raising safety concerns (1,183 page views).

Staff members in CEA-PA have also been looking at different strategies to reiterate the importance of safe operations in all spaces at the Laboratory. Recognizing that regular communication supports strong engagement between management and employees and enables cultural change, employee newsletters for the Capital Projects and Facility and Operations Associate Directorates have highlighted one of the nine Life Critical Rules for serious injury and fatality prevention — such as heavy equipment safety and distracted driving — through colorful infographics for sharing with teams and groups. The newsletters have also included articles with the goal of improving safety awareness on an extensive range of safety topics, such as the importance of voicing concerns in unexpected conditions, helping stop hazardous energy events, and how adapting to change in a complex environment teaches resiliency.

## Laboratory Has Launched Fieldglass, a New Staff-Augmentation System

The Laboratory has launched Fieldglass, a new system, and AgileOne, a managed service provider, which, when combined, support the staff-augmentation program. The system will be used initially to support three pilot suppliers: Longenecker & Associates, TechSource, and Merrick SMSI.

The remaining staff-augmentation suppliers will be incorporated into Fieldglass once (1) the solicitation process is complete, and (2) new contracts are awarded to them (spring of 2021). Once these two deliverables are complete, all Laboratory managers and staff-augmentation program suppliers will use Fieldglass for contingent-labor job postings, time sheets, expense submittals, and invoicing.

Implementing Fieldglass makes up part of an ongoing initiative to improve how the Laboratory procures, tracks, and manages its staff-augmentation program (i.e., contingent labor workforce). The transition to Fieldglass provides significant benefits, such as centralizing staff augmentation, enhancing the ability to meet the Laboratory's staffing needs, and increasing process efficiency through a central point of contact for the Laboratory's hiring managers.

## Laboratory Introduces Revitalized and Focused Branding

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In January 2021, the Laboratory rolled out an all-new branding initiative to the workforce. The new branding included a new logo, a brand color palette and typography, a style guide, and templates for memos, business cards, presentations, and more. This bold new identity is optimized for use in digital and mobile applications. The identity can also be viewed online on the Laboratory's website ([lanl.gov](http://lanl.gov)) and in social media accounts. The new logomark reflects the strength and future of the Laboratory, with the updated brand guidance laying the foundation for more interactive and dynamic communications products going forward.

## Laboratory Teams with the United Kingdom to Share Information on Decommissioning and Decontamination

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A recent external review of the Laboratory's decommissioning and decontamination (D&D) activities recommended that Triad National Security, LLC, join the United Kingdom's Alpha Working Group. The peer review, which took place in September 2020, noted that the Laboratory shares many of the same issues that colleagues in the UK are addressing, such as resource retainment, benchmarking, technology development, training, and career development. By collaborating with the working group, the Laboratory team (with members from the Capital Projects Directorate and the Weapons Production Directorate) shares lessons learned and exchanges valuable information with peers across the pond.

The Alpha Working Group consists of members of the UK's Nuclear Decommissioning Authority (NDA) and members of DOE. The group meets every 45 days or so to collaborate on matters regarding radioactive waste management and alpha materials production and management. The purpose of the Alpha Working Group is to leverage experience and expertise for the collective benefit of both NDA and DOE.

Expertise in many areas is vital in a D&D operation involving nuclear material. Subject-matter experts from Weapons Production provide guidance and direction to the team members from Capital Projects, who are tasked to perform the D&D work. There is a synergy that is required of everyone involved, and communication between all team members is key. Team members

from both Laboratory directorates meet regularly to discuss training, operations, issues, lessons learned, and next steps. The two groups also coordinate through an "action tracker" dashboard, which helps members coordinate and integrate activities.

## Seven Laboratory Employees Complete Battelle-Sponsored Career-Development Training

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The following Laboratory employees from the Business Management Directorate (BUS) completed a year-long Battelle Business Leadership Program (BLP): Mike Cisneros, Mik Cunningham, Liz Medina, and Christina Romero. In addition, the following BUS employees competed in a year-long Battelle Early Career Development Program (ECDP): Cole McGee, Mychael Parish, and Jillian Sarnowski. These employees applied and were accepted into these programs, where they participated with employees from other Battelle-managed laboratories, thus enabling them to extend their professional networks. Programs were sponsored by the Chief Financial Officers (CFOs) from Battelle, along with each of the Battelle-managed laboratories.

Geared toward mid-career professionals, the BLP challenged participants to analyze common issues and situations faced by peers at other laboratories. Participants then presented possible solutions to the CFOs. This program also provided training opportunities designed to build character and management skills.

Geared toward early-career professionals, ECDP provided participants with opportunities to hear from and be heard by the CFOs. Participants also took part in virtual laboratory visits and gained an understanding of each laboratory's role in the DOE/NNSA mission. This program also provided training opportunities designed to build communication and leadership skills.

## Supply-Chain Management Increases Efficiency in Support of Plutonium Operations

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Supply-chain management and procurement represents a challenging and crucial component of plutonium operations. Procurement teams increased their capacity and efficiency over 2020. The procurement team processes numerous items and service contracts, such as vacuum gauges, nonnuclear hemi-shells, machined components for molds, and surveillance-related items.



- In November 2020, procurement teams that support weapons production successfully processed 600 procurement requests for TA-55, a 105 percent increase from November 2019.
- In materials management, the TA-55 warehouse team acquired 161 items and distributed 771 items in support of the TA-55 warehouse.
- The project team purchased and received 409 items and distributed 250 items in support of more than 63 small and large projects.
- Employees participated in more than 10 design reviews in support of the Radioactive Liquid Waste facility, Capital Projects, and TA-55 Maintenance Projects to identify issues early that could delay procurements. Resolving issues before the final design is released minimizes costly design changes that result in schedule delays, all of which supports the infrastructure and equipment needs for pit production.

Weapons program procurement cycle times have also improved as teams have implemented continuous improvement initiatives. The group's ability to staff up and work collaboratively to develop action lists and program goals will ultimately lead to successfully procuring all weapons program and nonweapons program materials needed for the 30 PPY process, so that such materials are on hand a year in advance of scheduled need.

## **Tritium Agreement Approved with Savannah River (ALDW/DDW)**

On December 23, 2020, the Laboratory's Weapons Engineering Tritium Facility and the Savannah River Tritium Enterprise approved a collaborative work agreement, with tritium recovery and packaging to the Savannah River Site already underway for tritium recycle. The agreement allows the Laboratory to ship AL-M1s, legacy containers with molecular sieves that hold tritiated water in a shipping package known as a bulk-transfer shipping package. This new container and process represent a major victory, one that ensures robust recycling activities and avoids expensive (approximately \$1.5 million) previously used flanged waste containers. Keys to success include collaborative communications, an integrated schedule, joint Level 3 milestones, and a signed interface order with technical details that provides joint benefits for the Laboratory and the Savannah River Site.

## **UI Expects to Reduce Project Estimate by \$160 Million**

Utilities and Institutional Facilities (UI) anticipates reducing a project estimate for the Electric Power Capacity Upgrade (EPCU) line-item project by \$160 million. The division informed NA-522 of this significant cost reduction from \$360 million to \$200 million during a briefing this week.

The project team will still meet all key performance parameters of the approved Project Requirements Document. The savings estimate is the culmination of several months of work involving an electrical modeling subcontractor and a conceptual design subcontractor, as well as several meetings with mission programs to generate alignment. Based on this successful briefing, the project team next briefed Ken Sheely/NA-52 and Jim McConnell/NA-50 in January 2021 and moved the project along the path to inclusion in the FY23 Congressional budget. This project will ensure that the Laboratory has adequate electrical power to support planned growth for the next 30 years.

### **COMMUNITY RELATIONS**

## **Family Friendly New Mexico names the Laboratory Among 2021 Platinum-Level Employers**

The Laboratory received the 2021 Family Friendly Business Award™ for the second consecutive year from Family Friendly New Mexico, an organization that recognizes and supports businesses that have implemented family-friendly policies designed to support employee work/life balance. Such policies cover seven principal areas: (1) paid leave, (2) health support, (3) work schedules, (4) economic support, (5) pay equity, (6) diversity/inclusion, and (7) community investment. Platinum-level recipients — known as Distinguished Leaders — have policies in categories 1–4 and at least one policy in categories 5–7.

Award selection is based on how businesses integrate several laws designed to promote and protect the rights of women and mothers in the workplace; these laws include the Promoting Financial Independence for Victims of Domestic Abuse Act, the Nursing Mothers' Rights at Work Act, and the Fair Pay for Women Act. A nonprofit initiative, Family Friendly New Mexico recognizes New Mexican businesses that acknowledge the importance of work/life balance. The Albuquerque-

que-based group supports businesses that adopt family-friendly policies that in turn help attract loyal and qualified employees to the state.

## First Painting Added to Bradbury Science Museum's Permanent Collection

"The Powder Men," a painting by John Hull, has become the first to join the fine art category of the Bradbury Science Museum's permanent collection. The painting depicts Laboratory physicist (and the artist's father) McAllister Hull introducing eight newly arrived "powder men" (a nickname for men working with raw explosives powder) to their mission of casting explosive lenses for Fat Man, the plutonium bomb developed during the Manhattan Project.

The Bradbury Science Museum is grateful to the Hull family for gifting this remarkable painting to the museum in 2003. Three generations — McAllister, John and Isaac Hull (John's son) — are listed on the donation record. McAllister Hull, a longtime physics professor (including at the University of New Mexico), died in 2011.

## Nuclear Enterprise Science and Technology Certificate Program Begins at UNM-LA

The Associate Laboratory Directorate for Weapons Production (ALDWP) and the National Security Education Center (NSEC) have teamed to develop a new Nuclear Enterprise Science and Technology (NEST) Academic Certificate program. This program will be offered through the University of New Mexico-Los Alamos (UNM-LA).

Kicked off on January 19, 2021, despite snow closures, this pilot program received accreditation by the State Higher Education Department (HED) in FY20. The program has been designed for the Laboratory's existing fissile material handler technician and technologist employee workforce. It will provide essential science, operations and business education on all facets of working in modern nuclear-materials-handling and processing facilities. The first course for the certificate program is titled "Nuclear Facility Fundamentals." A call for nominations went out to the directorate and a cohort of 15 individuals has been identified to start the program.

## Virtual Camp on Wildfire Simulation and Visualization Targets Native American Undergraduates

From December 7 to December 18, 2020, the LANL Student Programs Office hosted a two-week virtual camp in wildfire simulation and visualization for 12 undergraduate students, the majority of them Native American. Using real-world data Laboratory scientists use to study wildfires, the students learned how to use Paraview, a data analysis and visualization software application. Using Paraview, the students developed graphical and animated representations that can aid in wildfire suppression to protect the public, ecosystems, watersheds, and air quality.

Part of a multi-year initiative through the Student Programs Office to increase the number of Native American student interns at the Laboratory, the pilot program was funded by the Laboratory and the DOE's Workforce Development for Teachers and Scientists Office within the Office of Science.

The program's technical leaders were John Patchett on the computational side, and Rod Linn, whose expertise is in wildfires. Supporting these two leads were 18 other Laboratory volunteers who helped students with hands-on activities and gave talks on their academic and professional experiences.

## SELECTED MEDIA COVERAGE

['Garbage to Gas: Using Biodigesters to Create Energy' Wins 2020 New Mexico Governor's STEM Challenge](#)

*Los Alamos Reporter (12/22)*

Student scientists at Monte del Sol Charter School earned a \$4,500 cash prize awarded by Los Alamos National Laboratory judges in the New Mexico Governor's STEM Challenge with their project, "Garbage to Gas: Using Biodigesters to Create Energy."

[LANL Holiday Gift Drive Raises \\$58,000, Buys 2,500+ Gifts for Senior Citizens, Kids and People Facing Homelessness](#)

*Los Alamos Reporter—Maire O'Neill (12/23)*

LANL employees donated \$58,000 for holiday gifts for senior citizens, youth, and people facing homelessness distributed through local nonprofits like Barrios Unidos, Gerard's House, and Help NM, as well as the

New Mexico Children, Youth and Families Department (CYFD).

### [\*\*Multi-Messenger Astronomy Offers New Estimates of Neutron Star Size and Universe Expansion\*\*](#)

*Science Daily—Staff Report (12/23)*

"We studied signals that came from various sources, for example recently observed mergers of neutron stars," said Ingo Tews, a theorist in Nuclear and Particle Physics, Astrophysics, and Cosmology group at Los Alamos National Laboratory, who worked with an international collaboration of researchers on the analysis that appeared in the journal *Science* on December 18, 2020.

### [\*\*LANL-Developed Technology Offers Promise of Safer X-Rays\*\*](#)

*Santa Fe New Mexican (1/3)*

The Los Alamos prototypes offer a hundred times more sensitivity than conventional silicon-based detectors. And unlike their silicon cousins, the perovskite versions don't require an outside power source — instead the energy of the x-rays themselves is enough to run the detectors.

### [\*\*Deep Science: Using Machine Learning to study Anatomy, Weather and Earthquakes\*\*](#)

*TechCrunch—Devin Coldewey (1/4)*

The most recent discovery, made by researchers at Los Alamos National Labs, uses a new source of data as well as ML to document previously unobserved behavior along faults during "slow quakes."

### [\*\*New Machine Learning Algorithm Could Assist Pulmonary Doctors in Optimizing Ventilator Treatment for COVID-19\*\*](#)

*HospitMedica (1/4)*

Cross-disciplinary scientists and engineers at Los Alamos National Laboratory are working to learn how Intrapulmonary Percussive Ventilation (IPV) helps clear mucus from blocking the airways of the human lung, a common reaction to the SARS-CoV-2 virus.

### [\*\*The LANL Workout\*\*](#)

*Santa Fe Reporter—Julia Goldberg (1/5)*

While one might not immediately think of Los Alamos National Laboratory when looking for workout advice, that's where you'll find tips on "deskercise," a seven-minute routine directed at those of us who now telecommute from home and rarely stand up from our desks.

### [\*\*Los Alamos National Laboratory Part of Team Working to Help Wildfire Management\*\*](#)

*KRQE-TV (1/8)*

The Los Alamos National Laboratory is part of a team working to combat wildfires. They're developing a tool, called QUIC-Fire, to help make prescribed burns more efficient, which can help prevent more serious wildfires down the line.

### [\*\*Science Can Help Ease Local Wildfire Threats\*\*](#)

*Taos News—Michael Hazen (1/10)*

As drought and wildfires continue to devastate forests in Northern New Mexico and across the Western United States, it's natural to wonder if we're doing enough to keep our communities and lands safe. Smoky summer skies over Los Alamos and other surrounding communities provide yet another reminder that danger is just a spark away.

### [\*\*Department of Energy Los Alamos Field Office Proposes Facility for Isotope Production Used in Cancer Therapies\*\*](#)

*Los Alamos Reporter (1/11)*

The U.S. Department of Energy (DOE), National Nuclear Security Administration (NNSA) Los Alamos Field Office issued a categorical exclusion (CX) determination to construct and operate a Light Manufacturing Facility to support DOE/NNSA's Isotope Production Program.

### [\*\*Face Swap in the Mainstream: What Deepfakes are and How to Detect Them\*\*](#)

*KRQE-TV (1/11)*

Justin Moore is the research scientist in the Advanced Cyber Systems group at Los Alamos National Laboratory ... said deepfakes have also been used for entertainment purposes, which is how people are most likely to come across them.

### [\*\*Los Alamos National Laboratory Approved by State to Provide Employees with COVID-19 Vaccines\*\*](#)

*Los Alamos Reporter—Maire O'Neill (1/12)*

Los Alamos National Laboratory has announced to employees that the Laboratory has been approved by the state of New Mexico to provide COVID-19 vaccines to employees on-site and has tested the process with vaccinations of frontline medical staff while the general rollout plan is being finalized.

### [\*\*Experts: STEM Workers to Drive NM's Future\*\*](#)

*Albuquerque Journal—Pilar Martinez (1/12)*

The next decade could prove to be a crucial turning point in New Mexico's economic future, with public universities and national laboratories taking the lead, according to speakers at the University of New Mexico's third business and economic summit.

### **Gene Team: Los Alamos National Laboratory Scientist Bette Korber Leads a Team Tracking the Virus that Causes COVID-19 and Watching for Mutations**

*Santa Fe Reporter—Julia Goldberg (1/12)*

One of the scientists studying those genomes is Bette Korber, a Los Alamos National Laboratory fellow in the Theoretical Biology and Biophysics Group. Korber leads an interdisciplinary team that provides bioinformatics, theoretical and statistical support in collaborative efforts with experimental researchers, focusing on the areas of HIV-1 viral diversity, the human immune response to infection, and vaccine design.

### **NM Identifies First Case of New Variant**

*Albuquerque Journal—Dan McKay (1/13)*

Bette Korber, a theoretical biologist at Los Alamos National Laboratory, said Wednesday that it isn't surprising to see the variant surface in New Mexico. It was first detected in the United Kingdom but has been identified in the United States too. The presence of the variant, she said, is all the more reason for New Mexicans to wear face coverings, continue social distancing, and take other steps to prevent transmission of the disease.

### **Los Alamos National Laboratory 2020 Year in Review**

*Los Alamos Daily Post—Carol Clark (1/15)*

Looking back over 2020, Director Thom Mason said it is the 13,000 Laboratory employees that he is most proud of ... how they have stepped up and met the challenges of a global pandemic.

### **COVID-19: What Do We Know About the New Coronavirus Variant?**

*Medical News Today—Maria Cohut and Yella Hewings-Martin (1/18)*

One of the most widely talked about mutations has resulted in the [D614G variant](#). This causes a change in the spike protein, which interacts with the ACE2 receptor on human cells to facilitate viral entry. Specifically, an amino acid in the spike protein at position 614 is changed from aspartic acid to glycine. [Research](#) by Dr. Bette Korber, from the Los Alamos National Laboratory, in New Mexico, and colleagues suggests that this change allows the variant to infect people more easily.

### **Garbage to Gas**

*Santa Fe Reporter—Leah Cantor (1/18)*

A team of Monte Del Sol students won \$4,500 in December in the New Mexico Governor's STEM Challenge for their "garbage to gas" biodigester project. Benigno Sandoval, a mechanical engineer at Los Alamos National Laboratory who served as one of the judges in the

competition, tells SFR the students' tenacity in the face of the setbacks helped them win first prize.

### **Chemistry and Metallurgy Facility Replacement Subproject at LANL Completed Ahead of Schedule, Under Budget**

*Los Alamos Reporter (1/21)*

The Department of Energy's National Nuclear Security Administration (NNSA) Chemistry and Metallurgy Research Facility Replacement (CMRR) Project completed construction and turnover activities for the Plutonium Facility (PF-4) Equipment Installation Phase 1 (PEI-1) Subproject at Los Alamos National Laboratory (LANL) on Jan. 8.

### **Are Visualizations the Future of Science?**

*Albuquerque Journal (1/24)*

As supercomputers expand the ability to combine complex models, these scientific visualizations

will play an increasingly crucial role in science itself. Because as the questions posed grow more complex – whether that's a potential meteor strike or melting ice shelves.

### **Science and Plastics: Solutions for Pollution in the Works**

*Santa Fe New Mexican (1/24)*

Solutions might be in the works, courtesy of science. And Los Alamos National Laboratory is helping lead the charge ... the initiative is called BOTTLE for Bio-Optimized Technologies to keep Thermoplastics out of Landfills and the Environment.

### **Bradbury Science Museum Offers its 20-Minute History Movie on Project Y in Spanish**

*Los Alamos Reporter—Maire O'Neill (1/26)*

Bradbury Science Museum is now offering "Racing Toward Dawn" — its signature 20-minute history movie — in Spanish. Originally released in English in 2019, the movie explores the science that drove Project Y at Los Alamos and the science that directly influences the Los Alamos National Laboratory's global security mission today.

### **LANL: Newly Identified Tiny Mineral Named for Los Alamos and University of Wisconsin Scientists**

*Los Alamos Reporter—Maire O'Neill (1/26)*

A vanishingly tiny mineral is being named for two scientists who have revolutionized the analysis of mineral samples. Xuite (pronounced "zoo-ite"), the newest member of the nano-mineral pantheon, is named in honor of Los Alamos National Laboratory mineralogist Hongwu Xu and the University of Wisconsin's Huifang Xu.



### **LANL: Dana Dattelbaum Wins Prestigious 2020 E.O. Lawrence Award**

*Los Alamos Reporter (1/27)*

Dattelbaum of Los Alamos National Laboratory is a recipient of the Department of Energy's prestigious E.O. Lawrence award for 2020. Dattelbaum is honored for "several transformative scientific and intellectual achievements, including her pioneering work providing physical insights into shock and detonation physics, her innovations in the development of the Equations of State of a spectrum of energetics and polymers, and providing critical data for hydrodynamic simulations essential to the nuclear weapons program."